08.12

Müll und Abfall

Technical Journal for Waste and Resource Management

Issue 44
August 2012
Pages 402–404

www.MUELLundABFALL.de

Special report

Analysis of the use of compostable ecovio® organic waste bags

with regard to acceptance of households, increase in organic waste diversion and impurities

Manfred Kanthak and Frieder Söling

Analysis of the use of compostable ecovio® organic waste bags

with regard to acceptance of households, increase in organic waste diversion and impurities

Manfred Kanthak und Frieder Söling

Dipl. Ing. Manfred Kanthak
Studied Environmental Engineering at the TU Berlin. Managing Partner at Kanthak & Adam GbR, Beratung und Problemlösung im Bereich der Abfallwirtschaft, since 1996.

Dipl.-Wi.-Ing. (FH) Dipl. Biol. Frieder Söling
Has worked at Berliner Stadtreinigung since 2001. Part of the Executive Office, responsible for the coordination of the in-house Ideas Laboratory and the implementation of innovative projects.1990–2001 Project Leader and Head of Department for Municipal Waste Management in various Berlin consultants offices

Abstract

The distribution of compostable ecovio bags to a total of 21.000 households in Berlin lead to a decrease of PE bags in the organic waste in favor of the ecovio bags.

The separately collected organic waste volumes increased compared to the reference measurements prior to project start. In all disctricts participating in the project in Berlin the organic waste volumes collected in the bins increased significantly after distribution of the compostable ecovio bags. This increase in organic waste diversion is primarily due to the use of the ecovio bags. Compared to the reference measurment, the organic waste volumes increased by 12 % to 14 %.

A comparison of this volume increase in the project districts compared to reference districts of Berlin confirms that this increase in organic waste separation is not due to seasonal trends.

The combined use of the ecovio bags along with a ventilated kitchen catcher further facilitated the organic waste collection in the households and led to a reduction of smells. The households participating in the pilot project described the organic waste collection with ecovio bags as more convenient and hygienic than alternative approaches for organic waste collection.

The ecovio bags, and the organic waste collected in these bags, could bothe be processed in the composting plant without any difficulties or impairment of the compost quality. After two thirds of the compost cycle the residues of the ecovio bags were no longer visible and the compost quality was not impaired.

1. Description of the project

In the period between the end of August and the middle of December 2011, the use of ecovio® organic waste bags was trialed as part of a joint project involving BASF SE and Berliner Stadtreinigung (BSR) in two areas of Berlin with different population structures. ecovio® is a fully biodegradable plastic composed of sustainable raw materials (polylactic acid which in turn is produced from the sustainable raw material corn) and ecoflex®, BASF's petrochemical-based biodegradable plastic.

The aim of the trial was to gather data on the acceptance of organic waste bags and to determine the effect on the quantity and quality of the separated organic waste. Around 21,000 households took part in the trial, some of which were given a ventilated kitchen catcher to make collection in the kitchen easier.

The entire project was scientifically monitored. In addition to obtaining data on changes in the percentage of organic waste collected in conventional plastic (PE) bags and the documentation of a possible rise in the quantities collected, there was also a written questionnaire for the people taking part in the trial.

Since the plastic used for the biodegradable bags is extremely water-resistant and breathable, drying the organic waste in the bags could be documented in a laboratory trial over the 14-day period.

A large-scale trial in the Bad Dürkheim district was used to document the performance of the ecovio® bags investigated in composting organic waste at the beginning of 2011. If composting is carried out correctly, the ecovio® bags are completely degraded within the technical dwell time of 3 to 4 weeks. In view of this preliminary work, the performance of the ecovio® bags during composting was not re-examined in the project described.

The organic material collected as part of the project in Berlin, including the ecovio® bags, could be processed without any problems in the composting plants supplied since the material had already degraded after two thirds of the normal composting time and therefore the quality of the compost produced was not compromised.

The key results of the project are outlined below.

2. Trial areas

Three trial areas were selected for the project:

- Prenzlauer Berg, a residential area of predominantly renovated apartment buildings (Berlin block development)
- Hellersdorf 1, large housing developments
- Hellersdorf 2, large housing developments

At the start of the project, households were given ten free ecovio® organic waste bags and relevant information. Households in the Hellersdorf 2 area were also given a ventilated kitchen catcher. A total of 28 points of sale for purchasing additional bags were set up in the three trial areas.

3. Investigation of random container samples

Three surveys were conducted in each trial area. One survey was intended to determine the reference measurement prior to distribution of the ecovio® organic waste bags and the other two to document the progression of the project.

The filling level and weight of the container and the amount of packaged organic waste were determined before regular emptying of the 240 liter organic waste containers. Each survey covered 35 containers, the same sites being considered in each trial area for all three surveys.

The results of the first measurement after the organic waste bags were distributed showed a drop in PE bags in the organic waste in favor of the use of the free ecovio® bags. In contrast to Hellersdorf, other compostable bags were also used to collect organic waste in Prenzlauer Berg before and during the trial phase. It was also found in Prenzlauer Berg that the percentage of "packaged" organic waste rose after the ecovio® bags were distributed.

The container yield and thus also the quantity collected were higher during the first measurement in

the trial period than during determination of the reference measurement. The rise in the quantity collected is due primarily to the use of ecovio® bags. "Non-collectors" were motivated to use the organic waste bins as a result of the convenient and free of charge bags.

In all three trial areas, the container yield rose significantly after ecovio® bags were provided. Between 12 and 14 % more organic material compared with the reference measurement was collected using organic waste bins and consequently the main aim of this project, increasing the amount of organic waste collected, was achieved.

As part of the second measurement, it was ascertained that the use of ecovio® bags fell significantly because the free bags provided had been largely used up in the meantime. In addition, the amount collected was lower compared with the first trial measurement. In all three areas, the number of PE bags also fell compared with the reference measurement. In the second measurement, no or only a slight increase in the amount collected compared with the reference measurement was found.

4. Evaluation of weighing data for the collection of organic waste

Since the amounts of organic waste show considerable seasonal variations, weighing data from collection rounds both in the trial areas and in the reference areas in addition to weighing of containers had to be included, but this requires the containers in a full collection round and the containers in a trial area to largely match. These requirements were not met in either of the trial areas in Hellersdorf. The percentage of organic waste containers in the total number of containers on the collection round of a refuse vehicle here was only approximately 25 %, which means that in the corresponding collection round roughly 75 % of the emptied containers were outside the trial area. No significant changes due to the trial were found by evaluating the amount collected per round for 2011.

In the Prenzlauer Berg area, however, virtually 100 % of the organic waste containers on a collection round came from the trial area. The evaluation for 2010 shows a typical trend in amounts collected in the Prenzlauer Berg trial area. The quantities of organic waste collected fall there at the end of the year as in all collection areas in Berlin.

The picture for the Prenzlauer Berg trial area is different if we look at the average amounts collected for 2011. When the distribution of the ecovio® bags ended (middle of September), the quantity collected rose.

A rise in the monthly amount collected of approximately 11 % for the period up to the first trial measurement (end of October) could be seen compared to the reference measurement. A rise of 9 % compared to the reference measurement could still be seen up to the second trial measurement (beginning of December 2011).

Allowing for the weekly fluctuations in the amounts collected, the rise in quantities calculated as part of the weighing of containers and the actual change in the amount collected corresponded very well.

Figure 1
ecovio® organic waste bags

5. Results of the survey

A very comprehensive questionnaire was produced and given to the households participating in the pilot project. The results will not be given in detail at this point, but the following sets out the main points:

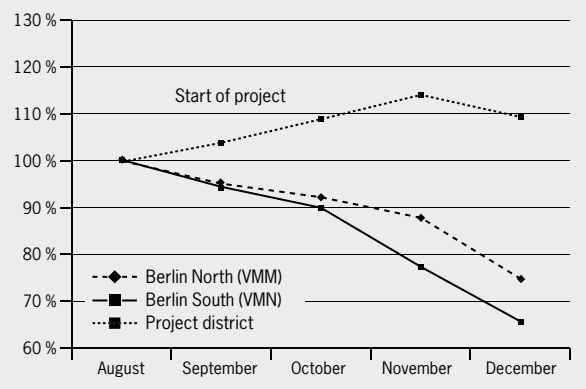
- The use of ecovio® bags makes collecting organic material easier because there is less contamination, collection is more hygienic and there is less odor.
- If the households questioned had a ventilated kitchen catcher, the ease of organic material collection was even greater.
- The ecovio® bags led to a more intensive collection of organic material because more organic material was collected by households that had already previously collected it and additional amounts due to the participation of households that had not previously collected it went into the organic material containers.
- The differences in the collection procedure between the trial areas could be confirmed by the results of the questionnaire, so in Prenzlauer Berg some of the households were already using biodegradable plastic organic waste bags prior to the trial.

6. Drying effect

To determine the drying effect due to the use of ecovio® bags for collecting organic waste, ordinary

Figure 2
Conventional (left) and ventilated kitchen catcher (right)

Figure 3
Change in the amount collected in the trial area and in the reference areas (in the trial period)



household kitchen waste was continuously placed in the appropriate kitchen catchers until they were completely full. The containers were stored at a temperature of 20 °C and a relative ambient humidity of 50 to 55 %.

The combination of ecovio® bags and a ventilated kitchen catcher led to a weight loss of 5 % in the kitchen waste (after 7 days) and 11 % after a 14-day trial period.

Further investigations on the drying effect of ecovio® bags in the collection of organic waste were conducted with garden waste (grass cuttings, leaves). The kitchen catchers were filled completely with the garden waste on the starting day and stored at 16 °C (relative ambient humidity of 50 to 55 %) over a period of 14 days. A weight loss of 9 % (after 7 days) and 14 % after a 14-day trial period was established for the garden waste.

All trials using a ventilated kitchen catcher experienced an in some cases significant reduction in odor. Despite the relatively long storage period of 14 days, the waste in the ventilated containers was not at all or only slightly affected by fungi.

Address of authors
Kanthak & Adam GbR
Rühmkorffstraße 6a
12209 Berlin
Frieder Söling
Berliner Stadtreinigung
Vorstandsbüro
Ringbahnstraße 96
12103 Berlin

Figure 4
Kitchen waste after 14 days in an ecovio® bag with a ventilated kitchen catcher